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**Plasticity in Reproduction and Survival under
Dynamic Socio-Sexual Environment:
Empirical Evidence from *Ephestia kuehniella* Zeller
(Lepidoptera: Pyralidae)**

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**Plasticity in Reproduction and Survival under
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(Lepidoptera: Pyralidae)**

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Abstract

Using an important pest of stored products, *Ephestia kuehniella* Zeller, I tested a number of theoretical predictions regarding strategies taken by males and females for resource allocations in response to dynamic socio-sexual environment. I demonstrate that males only respond to mean sperm competition levels and eupyrene sperm are produced both before and after emergence. Lifetime reproductive fitness in males depends on the number of copulations they can achieve, rather than the number of sperm ejaculated in each copulation. Regardless of whether males are exposed to rivals or not during their early adulthood, copulation duration and sperm allocation are not positively correlated, indicating that copulation duration cannot be used as a correct estimate of sperm allocation. Contrary to the previous prediction that males invest more in courting in the presence of rivals, my experiments demonstrate that males allocate more resource to courtship in the presence of additional females, which reduces their lifetime copulation frequency and fecundity. This finding offers a novel explanation for the success of mating disruption strategy using sex pheromones in pest management. Contradicting the previous prediction that females are more promiscuous under a female-biased condition and choosier in a male-biased sex ratio, my results show that perception of additional males makes females more receptive so that they mate more times and fertilise more eggs. Females call more when no additional mates or females are present than when either additional mates or females are present, suggesting that perception of no additional conspecifics by females may trigger them to allocate more energy for calling for further mating opportunities. Although virgin females lay similar numbers of eggs in all treatments, they start oviposition earlier and live shorter in the presence of conspecific males or females, supporting previous predictions that higher reproductive rate may accelerate senescence. Virgin females produce fewer eggs in male-biased than in female-biased sex ratio, suggesting that they reduce reproductive investment during their early life for mating opportunities under male-biased conditions. My studies provide insight into the plasticity in reproduction and survival under dynamic socio-sexual environment for animals with sexual reproduction in general and for this insect in particular.

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